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FLOOD DETECTION AND AVOIDANCE SYSTEM USING RASPBERRY PI 4

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ABSTRACT

Flood causes much damage to nature, human and animals lives. So as solution for this problem.we have to come with the idea of Flood detection and avoidance system using raspberry pi 4. This gives us idea about the flood, which help to move or save the people to safe place, and try to avoid the damage to the human lives or animal lives and also protect the property. In this project we use latest version of the raspberry pi 4 with some latest sensors, with these sensors we will detect the water level to alert people or organisation unit via SMS with the help of SMS gateway system

Keywords: raspberry pi 4, ultrasonic sensor, water level sensor, relay module.

INTRODUCTION

Flood is the most dangerous and natural damaging disaster in the world. It can destroy entire organization and community, Because of flood damage government spends millions of rupees to recover the flood damage areas. The climate of the entire earth is changing very fast and the reason behind is growth in population, cutting forest pollution .because of flood many lives had been destroy.Flood occurs when the water level of the river get increase or because of heavy rainfall. Flood can be more dangerous when it happens in the urban or ruler areas or in city. It can wipe out entire area with the loss of lives and property for this reason we design flood detection and avoidance system using raspberry pi 4to help the people or organization to alert from this problem.

BACKGROUND

Flood is a natural disaster and a worldwide phenomenon. It can destroy entire community. We cannot control the flood but we know when it happens with the help of flood detection and avoidance system. In this system we use raspberry pi 4 with sensor like ultrasonic, water level and SMS gateway. A SMS gateway sends SMS to the user who subscribe the SMS webserver.

REPORT ORGANIZATION

This provides literature survey or the related work to the proposed system. the problem definition of the proposed system or problem occurred in the previous work. the overall proposed system in which idea of designing of the raspberry pi system.

LITERATURE SURVEY

Flood is a natural disaster and there are many systems used for the detection of flood and even avoidance with the help of arduino, GSM module sensors etc. In the proposed system we use the latest technology for the flood detection and avoidance using raspberry pi 4. It is the 4th version then for the cost reduction we use SMS gateway for the SMS alert system instead of GSM module because GSM module required network coverage for the transmission and receiving of the SMS. Then we use this system for the flood detection and avoidance system.

RELATED WORK

- Edwin Guzman, Aileen Grace De Luna ,Valerie Shane Cuadra, , Christian Villanueva design the project of "Flood detector system using arduino" in 2016 for the flood detection system via SMS alert notification this system provides real time information and current water level condition.[3]
- JagadeeshBabuMallisetty and Chandrasekhar V. design the "Internet of Things Based Real Time Flood Monitoring and Alert Management system" in 2018 with the help of raspberry pi 3 and GSM module ultrasonic sensor used to detect water.[4]
- Uyioghosa B. Iyekekpolo, Francis E. Idachaba and Segun I. Popoola design "Early Flood Detection and monitoring system based on wireless sensor network"2018 In this project design for SMS communication Transmitter and receiver both having a GSM module with microcontroller and WIFI sensor.[5]
- Mohamed Ibrahim Khalafalfahadiwy and AzizahSuliman design the "Flood detection using sensor network and notification via SMS and public network" in 2011 using microcontroller and GSM system.[1]

PROPOSED METHODOLOGY

Now a days due to some reasons global warming is increasing and resulting in the form of floods, heavy rains, tsunamis etc. This natural disasters are creating a lots of problems for peoples living in flood prone areas the water carries along objects like houses, cars, furniture etc[3]. Flood detection and monitoring system using raspberry pi 4 is selected by us to solve such problems. This system is made up of advance technologies. We can help peoples stuck in such situations and we can also avoid such situation.

a. Block diagram

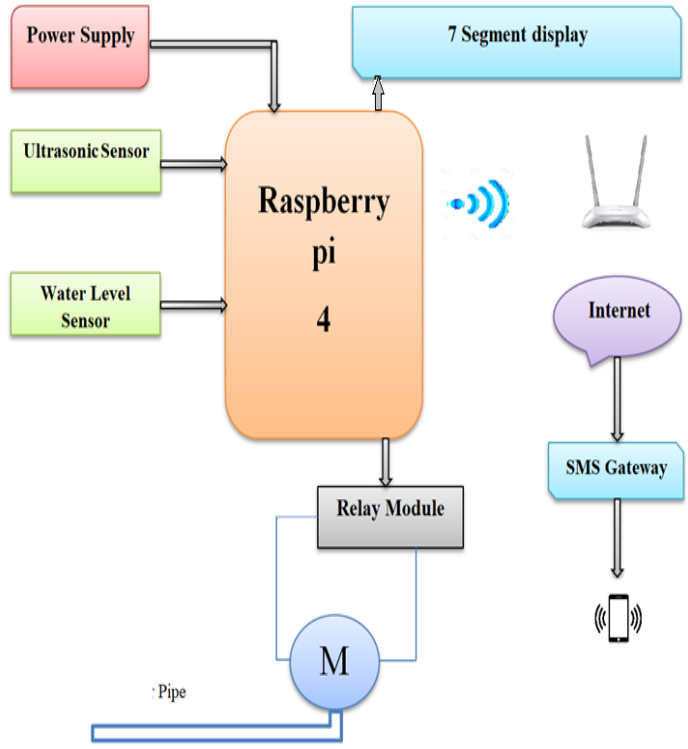


FIG.1. Block Diagram of Flood Detection and Avoidance System Using Raspberry pi 4

This system is much advance and having advantage for protecting the lives and properties. This proposed system is utilized for detecting and monitoring water level it also measure water level of dams or river with the help of ultrasonic sensor. When the ultrasonic sensor and water level sensor measure or detects the increasing water level it alerts via SMS to the user, organization or community via SMS gateway system, while the motor which is controlled by the relay module used to control the water level of the dam or river by realizing some water away from that area through pipe. Even the SMS gateway have some problem because of internet or problem in router the raspberry pi 4 have USB port for the dongle connection which is act as a internet provider.so we design this system to reduce the loss of lives and property

ALGORITHM

//U->Ultrasonic Sensor level

//W->Water level sensor

//R1->Reference level of water level sensor

//R2- >Reference level of Ultrasonic sensor

Step1:Collect the data from Ultrasonic sensor and water level sensor

Step2: If water level < Reference level and Ultrasonic sensor < reference level then go back the starting point

Step3: END if

Step4:ELSE:

Step5:Water level > Reference level of Ultrasonic sensor < reference level of water level sensor

// module will turn ON the Motor

Step6:then turn ON the motor()

Step7:END ELSE

Step8:while W>R1 and U>R2

//connection establish with WIFI for internet

Step9: Connect to WIFI()

Step10:Turn OFF motor

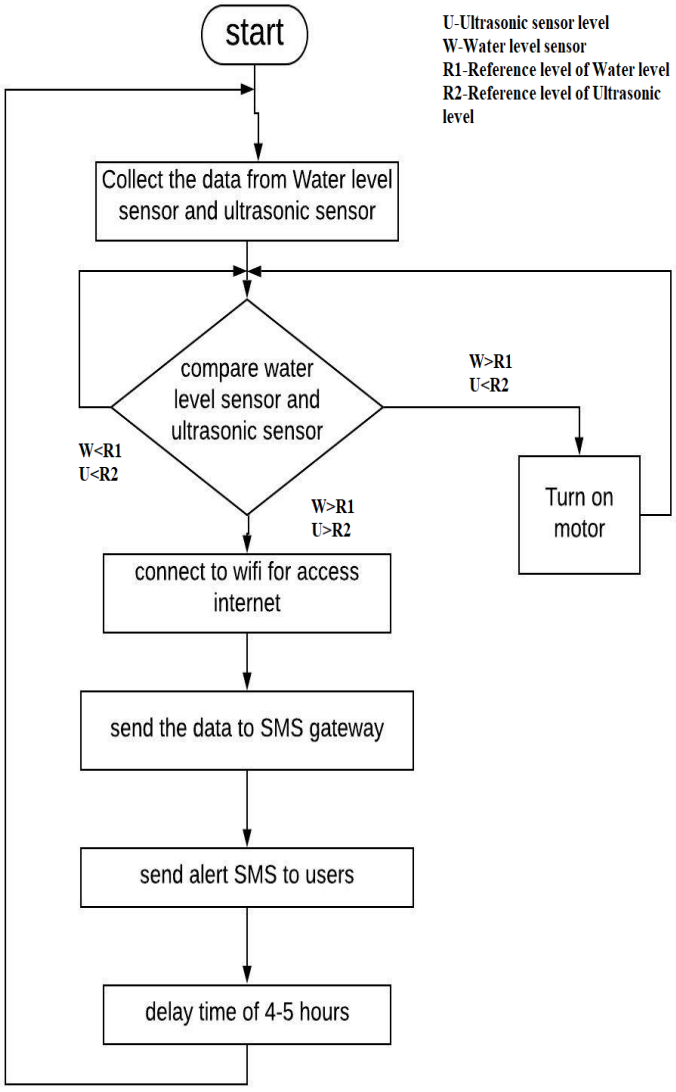
Step11: Send data to SMS gateway

Step12:send alert SMS to User

Step13:Delay(4-5)

//wait for 4-5 hours before refreshing the sensor module

FLOWCHART



A. Raspberry pi 4

Raspberry pi 4 is 40 times faster than arduino when it comes to clock speed. It has all the system like a computer with a, processor,dedicated memory and a graphics card for output through HDMI. It alsohavea Bluetooth and WIFI system inbuilt.

FIG.2. RASPBERRY PI 4

It is simply a credit-card sized electronic board inside a PC or laptop , but much smaller.It might sound like Raspberry Pi is powerful thanArduino. Raspberry Pi board is a fully functional computer and credit card size. It has all the things of a computer, with a dedicated memory, processor, and a graphics card for output through HDMI. It can runs special version of the Linux operating system.it is easy to install in Linux OS.

B. Ultrasonic Sensor

This is an ultra compact and reliable wireless module .it is an device which measures the distance using sound waves .itused to calculate the distance between the object and the sensor. It is a complete dual band GSM/GPRS. The model number is HC-SR04.it required less power for functioning with compact in size.

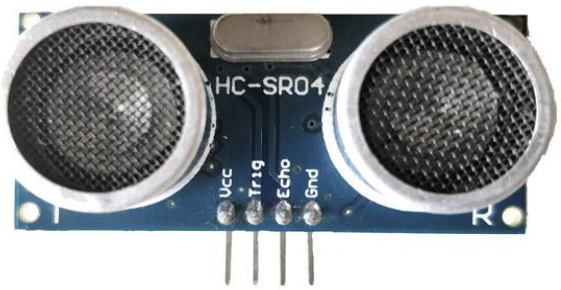


FIG.3. ULTRASONIC SENSOR

C. Water level sensor

A water level sensor indicates the water level and transmit that information to the control panel. It is a simple detector which is use to detect the water level.it is very paltry and small in size.it is used in water tank or it can also be used in other form like river or dam.

FIG.4. WATER LEVEL SENSOR

D. SMS GATEWAY

SMS gateway is a communication media to mobile and web server, which permitting transmit or receive the SMS without the use of smartphone. The regular process of SMS gateway system is corresponding to the simple SMS system. SMS gateway routes message to web server. In this project we are going to use outbound service that means the SMS sends through web server to the mobile user or authorized organization via SMS gateway with the help of raspberry pi 4.

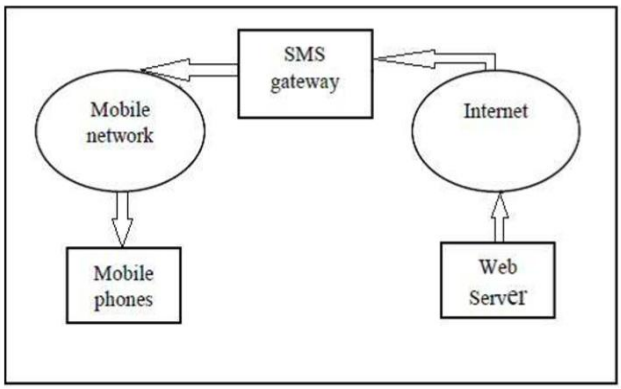


FIG.6. BLOCK DIAGRAM OF SMS GSTEWAY

The gateway work as a relay, that translate one protocol into another. Wireless network operators use SMS gateways to connect SMS centre (SMSCs).An SMSC is a wireless network that handles some operation like SMS, routing, forwarding and storing incoming text messages. Remote web server which provides outbound SMS via web server If message is sent from webserver it will be routed through SMS gateway by mobile communication system.

A. RELAY MODULE

A relay module is a electromagnetic switch.it is used as electromagnet to open and close the circuit contact. In relay module to protect the circuit from overload and defect multiple operating coils are used.

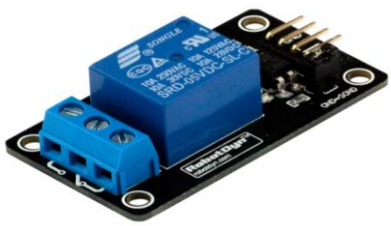


FIG.5. RELAY MODULE

The relay module is used to control the motor which is connected to it. The motor is used to control the level of water of the flood or Dam. For the Dams we can use the motor to controls the door to maintain the level of the water.

RESULT ANALYSIS

This project will detect the flood level. The main aim of our project is to alert people and save our environment from getting destroyed. We can avoid the flood using alert SMS system. Following table shows some details about our result.

Speed	In our system accuracy and speed is increased because we have used latest technology Raspberry Pi 4.
Time	This system is real time which save the time.
Connectivity	If there is any problem in using wifi then we can use dongle.
Network System	In previous system GSM module was used but we are using SMS gateway because GSM module has limited network area.

CONCLUSION

The flood detection and avoidance system using raspberry pi 4 is built to identify rising water level and to warn any potential flood risk. This system determines the water level using the sensors with the help of raspberry pi 4. To alert other people we are using this system. Using this system we are trying to save many lives and properties. The flood detection system using raspberry pi 4 can measure the height of flood, and with the help of that stored data or information we can alert the people or organization

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